

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

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VENUE :

SEAT NO :

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

TCP 2451–PROGRAMMING LANGUAGE TRANSLATION

(All sections / Groups)

25 OCTOBER 2019
9.00 am – 11.00 am
(2 Hours)

Question	Marks
1	
2	
3	
4	
Total	

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 10 pages with 4 Questions only.
2. Attempt All Questions. The distribution of the marks for each question is given.
3. Write all your answers in this Question paper.

Question 1

(a) Give a programming language example that is translated using a compiler. Explain why the given programming language is a compiler based translator. [2]

(b) Give a programming language example that is translated using an interpreter. Explain why the given programming language is an interpreter based translator. [2]

(c) Give a programming language example that is translated using a hybrid compiler. Explain why the given programming language is a hybrid based translator. [3]

Continued

(d) Give one advantage of a compiler over an interpreter. [2]

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(e) Give one advantage of an interpreter over a compiler. [2]

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(f) Indicate yes or no of the following terms when applied to the Java programming language. [1.5]

- i. scripting
- ii. declarative
- iii. fourth generation

i.
ii.
iii.

Continued

Question 2

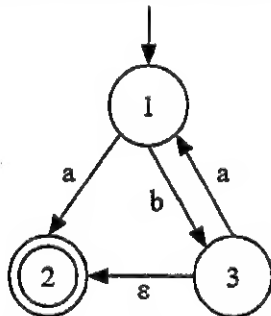
(a) Consider the following grammar. [3.5]

$$\begin{aligned} E &\rightarrow T X \\ T &\rightarrow (E) \mid \text{int } Y \\ X &\rightarrow + E \mid \varepsilon \\ Y &\rightarrow * T \mid \varepsilon \end{aligned}$$

- i. Find the set for the FIRST(E).
- ii. Find the set for the FIRST(X).
- iii. Find the set for the FOLLOW(E).
- iv. Find the set for the FOLLOW(X).

i.
ii.
iii.
iv.

(b) Consider the following NFA. [9]



- i. Explain what ε -closure of a state is using an example from the above NFA.

Continued

ii. Convert the NFA to a DFA using subset construction. Provide all the steps, the transition table, and the DFA.

Continued

Question 3

Consider the following grammar.

$$S \rightarrow b A i B$$

$$A \rightarrow \varepsilon$$

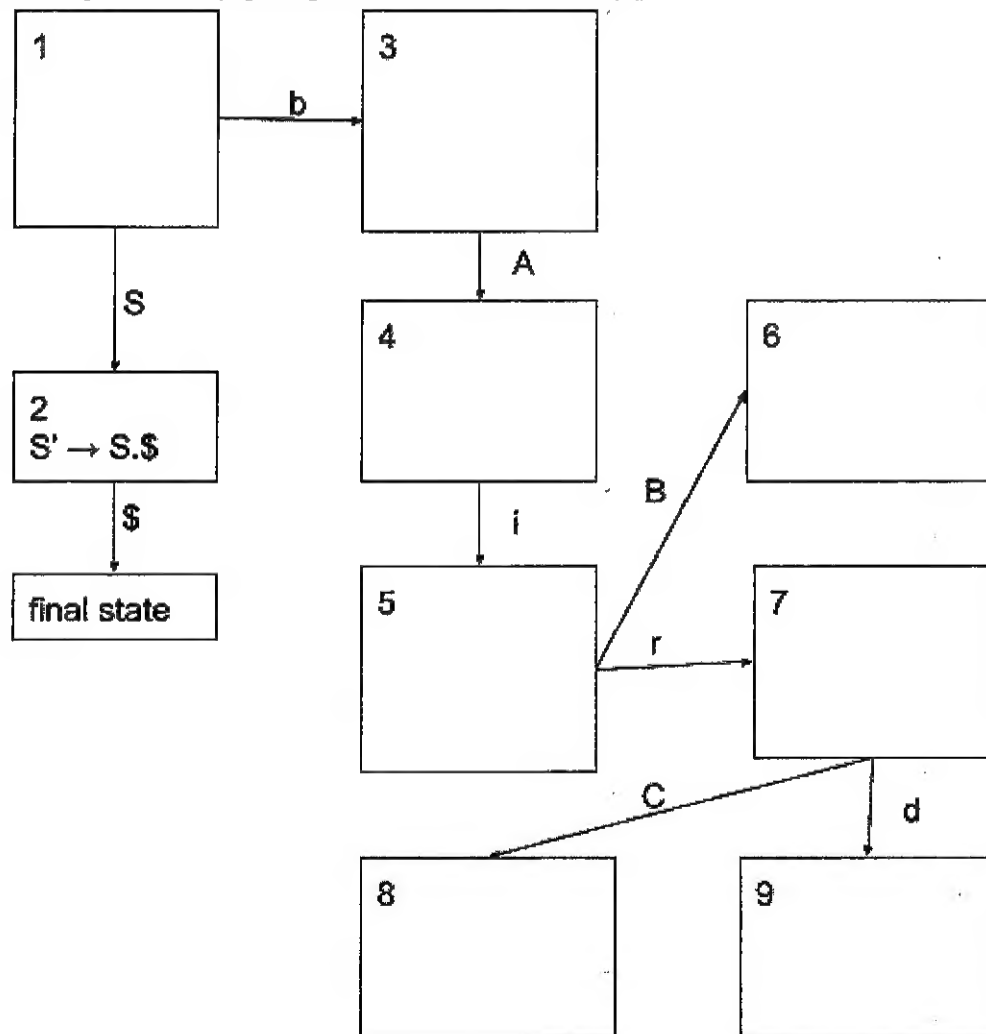
$$B \rightarrow r C$$

$$C \rightarrow d$$

where $b, d, i,$ and r are terminals.

(a) Augment the start symbol. [1]

(b) Complete the following DFA of LR(0) to illustrate transitions between states for the augmented grammar by giving all the states of items. [8]



Continued

(c) Construct the LR(0) parsing table. [3.5]

Continued

Question 4

(a) Consider the following code segment. [2]

```
var = 3108;  
double var;
```

Does the above code segment have scope error? Explain your answer.

(b) Optimize each of the following code segment and then explain your answer. [5.5]

i.

```
ST x y  
ST y x
```

ii.

```
LD R2, R1  
GOTO L1  
L1: GOTO L2  
L2: INC R1
```

Continued

(c) Convert the expression $-(a-b)+c$ into each of the following. [5]

- i. syntax tree
- ii. three-address code
- iii. quadruples
- iv. triples
- v. indirect triples

i.

ii.

iii.

Continued

iv.

v.

End of Page